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3-जबड़े और 4-जबड़े स्क्रोल संचलित स्वत: संकेन्द्रक खराद चक — विशिष्टि

(दूसरा पुनरीक्षण)

Indian Standard

3-JAW AND 4-JAW SCROLL MANUALLY OPERATED SELF-CENTERING LATHE CHUCKS — SPECIFICATION

(Second Revision)

ICS 25.080.10

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 1999

Price Group 4

Machine Tools Elements and Holding Devices Sectional Committee, PE 02

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Machine Tools Elements and Holding Devices Sectional Committee had been approved by the Production Engineering Division Council.

This standard was first published in the year 1964. In view of the experience gained in the implementation of the standard over the years and consequent upon the publication of the International Standard ISO 3089:1974 'Self-centering, manually operated chucks for machine tools — Normal accuracy — Acceptance test specifications (geometrical tests)', the committee responsible for the preparation of this standard decided to revise the standard. In the revised standard the Rigidity Test was deleted and the requirements of ISO 3089 were fully incorporated. Mating dimensions of the jaws were also eliminated in the revised version.

The second revision incorporates the hardness values of scroll and pinion and also aligns accuracy of work holding with ISO 3089:1991 standard. While revising the standard considerable assistance has been derived from DIN 6350 (Sheet 1 and 2) 'Lathe chucks, hand operated', issued by the Deutsches Institute für Normung (DIN) in August 1968 and December 1969 respectively and ISO 3089 : 1991 Self-centering manually operated chucks for machine tools — Acceptance test specifications (geometrical tests) issued by the International Organization for Standardization (ISO).

This is one of the series of Indian Standard on chucks. The other standards in this series are as follows:

IS No.	*Title*
10612 : 1983	4-jaw independent lathe chucks — Specification (*first revision*)
14725 : 1999	2-jaw and 3-jaw hand operated heavy duty cam type self-centering chucks — Specification
14693 : 1999	2-jaw and 3-jaw power operated wedge type chucks — Specification
14694 : 1999	2-jaw and 3-jaw power operated high speed lathe chucks with through bore — Specification
Doc No. PE 02 (0185)	Hand operated heavy duty 4-jaw independent chucks — Specification (*under preparation*)

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

3-JAW AND 4-JAW SCROLL MANUALLY OPERATED SELF-CENTERING LATHE CHUCKS — SPECIFICATION

(Second Revision)

1 SCOPE

This standard lays down requirements for mounting and accuracy of work-holding 3-jaw and 4-jaw scroll operated lathe chucks of normal accuracy for general purposes. It covers only manually operated, self-centering type of chucks.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encourged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS / ISO No.	*Title*
2063 : 1988 /ISO 230/1-1986	Acceptance code for machine tools — Geometric accuracy of machines operating under no-load or finishing conditions (*first revision*)
2582 (Part 1) : 1987 /ISO 702/1-1975	Dimensions for lathes spindle nose and face plates: Part 1 Spindle noses, canlock, Type A (*second revision*)
2989 : 1980	Keys for lathe chucks (*first revision*)

3 TYPES

Type A — Back mounted chucks (Chucks which are screwed from the rear), and

Type B — Front mounted chucks (Chucks which are bolted from the front).

4 TERMINOLOGY

4.1 For the purpose of this standard the following terms shall apply (*see* Fig. 1).

4.1.1 *Chuck*

Device to be mounted on the spindle nose or a fixture of a machine tool for holding a workpiece or a tool.

4.1.2 *Manually Operated Self-Centering Chuck*

This type of chuck has a self-centering action and is manually operated by means of a key that acts through the chuck mechanism to move the jaws simultaneously in radial direction.

4.1.3 *Chuck Body*

That part of chuck which carries jaws and encloses operating mechanism.

4.1.3.1 *Chuck face*

The face from which the jaws protrude.

4.1.3.2 *Back face*

That face of the chuck that contacts the face of the flange or adaptor when the chuck is mounted on the machine.

4.1.3.3 *Bore of chuck*

A through central hole in the chuck body.

4.2 Jaws

The work-holding members in chuck which engage with the internal mechanism of the chuck and also provide the gripping faces.

4.2.1 *Jaw Step Face*

The faces on the jaw steps which are parallel to chuck face.

4.2.2 *Internally Stepped Clamping Jaw (Reversed)*

Jaw that has shortest gripping portion towards the axis.

4.2.3 *Externally Stepped Clamping Jaw (Forward)*

Jaw that has longest gripping portion towards the axis.

4.3 Master Pinion

That pinion which is nominated as being the one to use in order to obtain the most accurate grip.

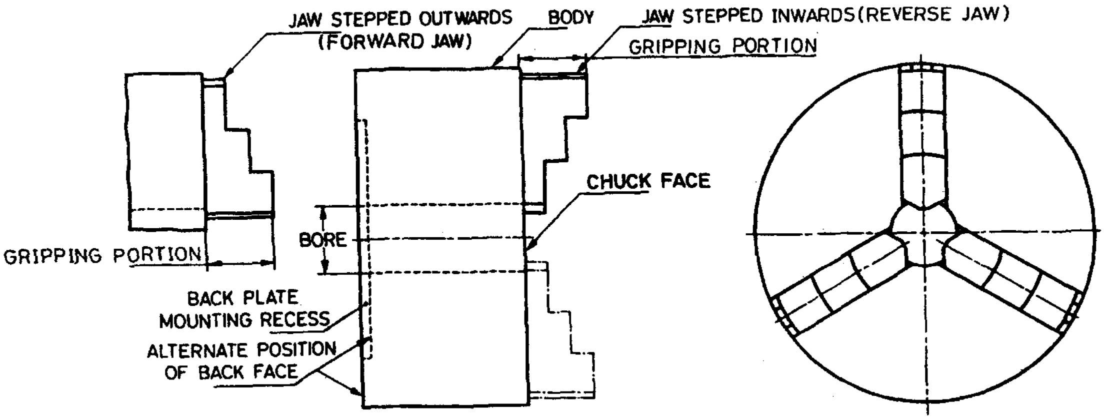

JAW STEPPED OUTWARDS (FORWARD JAW)
BODY
JAW STEPPED INWARDS(REVERSE JAW)
GRIPPING PORTION
CHUCK FACE
GRIPPING PORTION
BORE
BACK PLATE MOUNTING RECESS
ALTERNATE POSITION OF BACK FACE

FIG. 1 TERMINOLOGY FOR LATHE CHUCKS

5 MATERIAL

The various parts of the chucks shall be manufactured from the materials as laid below to meet with the requirements:

a) Body : Cast from a suitable grade of heavy duty cast iron having a hardness of 170 HB Min or forged or turned from a suitable medium carbon steel having a minimum tensile strength of 600 MPa.

b) Scroll : Suitable steel of tensile strength not less than 600 MPa hardened and tempered 28 HRC *Min.*

c) Jaws : Suitable steel of tensile strength not less than 400 MPa with gripping portion hardened and tempered to a hardness between 54 to 62 HRC and the remaining portion to a hardness of 28 HRC *Min.*

d) Pinions : Suitable steel of tensile strength not less than 600 MPa hardened and tempered to a hardness of 38 HRC *Min.*

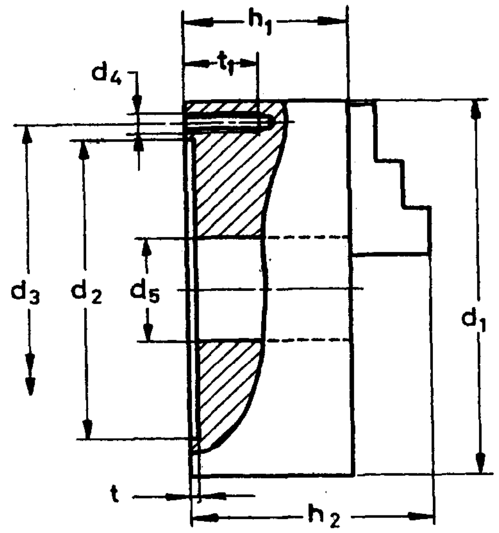
6 DIMENSIONS

6.1 Dimensions of lathe chucks shall be as given in Table 1.

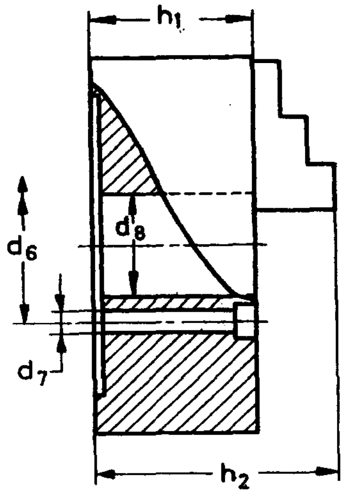
Table 1 Dimensions for 3-Jaws and 4-Jaws Scroll Operated Lathe Chucks

(*Clause* 6.1)

All dimensions in millimetres.



TYPE A — BACK MOUNTED CHUCK



TYPE B — FRONT MOUNTED CHUCK

Sl No.	Nominal Size d	d_1	d_2 H_7	P.C.D.		d_4			t_1	d_5 *Min*	Spindle Nose[1] Size No. (For Type B Chucks Only)	P.C.D. d_6 Tol ± 0.2	d_1			d_3 *Min*	h_1 *Max*	h_2 *Max*	t	Size[2] of Sq Key for Chuck	Weight[3] Approx Type A
				d_3	Tol on d_3 ±	Size	No. of Threaded Holes						Size Tol H12	No. of Holes							
							3-Jaw Chuck	4-Jaw Chuck						3-Jaw Chuck	4-Jaw Chuck						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
i)	80	82	62	70	0.2	M 6	3	4	12	19	–	–	–	–	–	–	44	58	3	6	1.5
ii) 100	102	76	87	0.25	H 8	3	4	16	23	–	–	–	–	–	–	50	63	3	8	3.2	–
iii)	125	125	95	108	0.25	M 8	3	4	16	32	–	–	–	–	–	–	56	80	4	9	5
iv)	160	160	125	140	0.3	M 10	3	4	20	42	5	61.9	10.5	3	4	42	65	98	4	10	8
v)	200	200	160	176	0.3	M 10	3	4	20	55	5	61.9	10.5	3	4	42	75	108	4	11	14
vi)											6	82.6	13			55					
vii)	250	250	200	224	0.35	M12	3	4	24	76	6	82.6	13	3	4	55	85	124	5	12	25
viii)											8	111.1	17			76					
ix)	315	315	260	286	0.4	M16	3	4	32	103	6	133.4	13	3	4	103	95	141	5	14	42
x)											8	111.1	17			76					
xi)	400	400	330	362	0.4	M16	3	4	32	136	8	171.4	17	3	4	136	108	156	5	17	68
xii)											11	165.1	21			125					
xiii)	500	500	420	458	0.4	M16	6	8	32	190	11	235	21	6	4	190	120	194	5	19	130
xiv)	630	630	545	586	0.5	M16	6	8	32	240	15	247.6	25	6	4	190	135	215	7	19	185

NOTE—For Type A chucks, additional suitable mounting holes on the face of the chucks could be provided at the discretion of the manufacturer.

[1] Conforming to IS 2582 (Part1) /ISO 702/1.

[2] Keys used on the chuck shall conform to IS 2989.

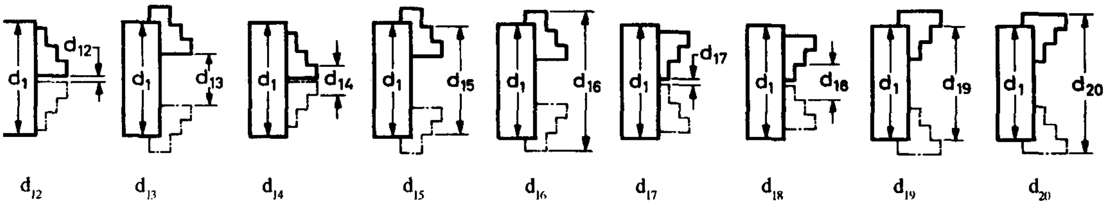
[3] The weights are for lathe chucks with chuck bodies made of cast iron with one set of jaws.

6.2 Chuck capacities shall be as given in Table 2.

Table 2 Chuck Capacities

(*Clause* 6.2)

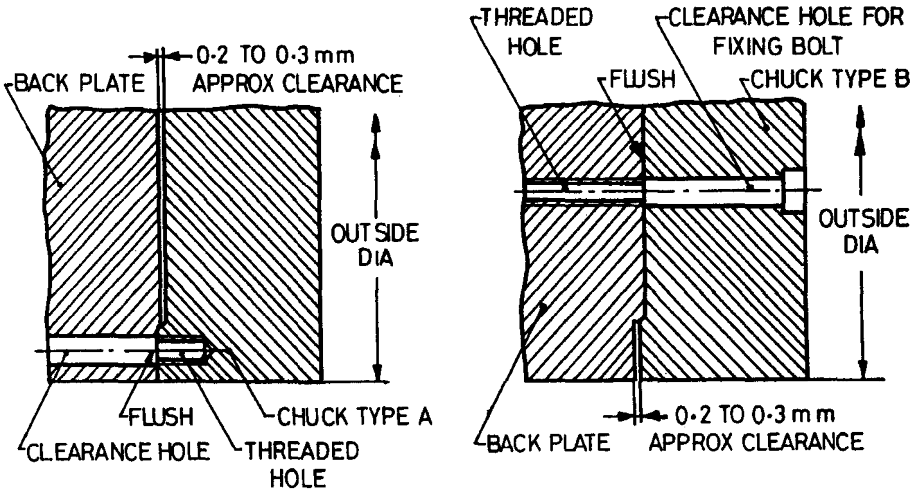
All dimensions in millimetres.



Sl No.	Nominal Size	Jaws with Shortest Step Outside				Jaws with Shortest Step Inside				
		Smallest Diameter Gripped	Largest Diameter Gripped	Smallest Diameter Gripped	Largest Diameter Gripped	Largest Diameter Gripped	Smallest Diameter Gripped	Smallest Diameter Gripped	Largest Diameter Gripped	Largest Diameter Gripped
	d_1	d_{12}	d_{13}	d_{14}	d_{15}	d_{16}	d_{17}	d_{18}	d_{19}	$d_{20} = d_{16}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
i)	80	2	27	22	69	91	2	24	71	91
ii)	100	3	33	25	87	115	3	32	93	115
iii)	125	3	42	34	112	148	3	38	120	148
iv)	160	3	68	42	154	200	3	48	160	200
v)	200	4	90	52	194	250	4	60	200	250
vi)	250	5	110	62	240	310	5	75	250	310
vii)	315	10	80	145	299	385	10	96	315	385
viii)	400	20	200	100	380	480	20	120	400	480
ix)	500	35	260	135	480	600	35	155	500	600
x)	630	50	350	170	610	750	50	170	630	750

7 MOUNTING INSTRUCTIONS

The lathe chuck shall be mounted on the back plate as shown in Fig. 2.



BACK MOUNTING ARRANGEMENT FOR TYPE A CHUCK

FRONT MOUNTING ARRANGEMENT FOR TYPE B CHUCK

FIG. 2 MOUNTING ARRANGEMENT FOR LATHE CHUCKS

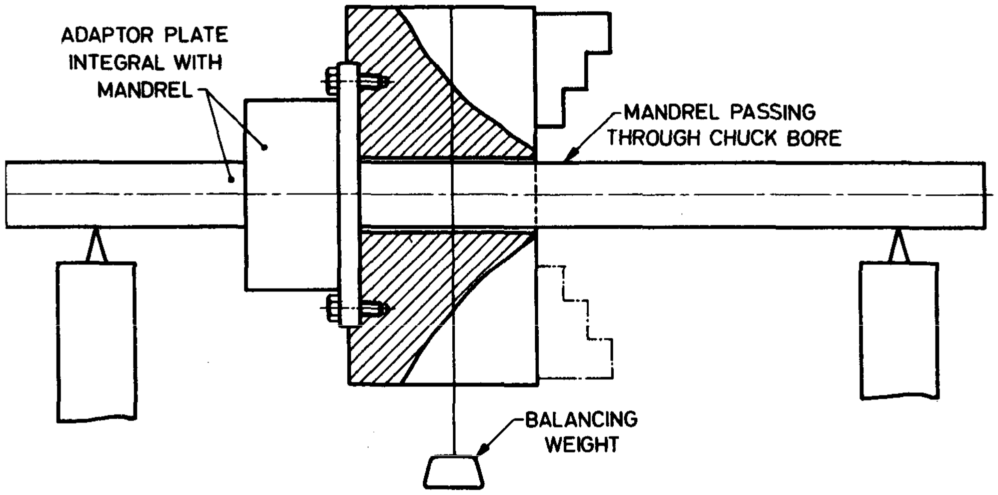


FIG. 3 STATIC BALANCE

8 DESIGNATION

A chuck shall be designated by:

a) number of jaws (3-jaw or 4-jaw),
b) type,
c) nominal size, and
d) the number of this standard.

Example:

A 3-jaw chuck, of Type A and of nominal size 160 mm shall be designated as:

Chuck IS 2876 3A 160

9 TESTS

9.1 Static Balance

The static balance of the chuck shall be tested in the following manner.

The chuck shall be mounted on a mandrel. The mandrel shall incorporate an adaptor plate integral with it and accurately finished to fit the back plate mounting recess of the chuck to be tested. The mandrel with adaptor plate shall be previously balanced without the chuck being mounted on it. The location of the cap screws, bolts or studs for holding the chuck on the adaptor plate shall be in balance. The chuck shall then be mounted on the adaptor plate and the mandrel placed on knife-edges as shown in the Fig. 3. The weights required to affect static balance for self-centering chucks shall conform to the limits specified below:

Nominal Size of Chuck mm	*Maximum Weight Required to Affect Static Balance* g
Up to and including 160	14
200 and 250	21
315 and 400	42
500	85
630	128

9.1.1 In all cases, the weights shall be applied at the periphery of chuck and the test shall be carried out only when the chuck is completely dry inside.

9.2 Geometrical Test

9.2.1 *Preliminary Remarks*

Since all the geometrical tests to be carried out involve the chuck rotation, the chuck should be mounted on a test spindle flange or adaptor. This flange or adaptor shall have been previously tested for the accuracy of size, centering, concentricity with the spindle axis and lack of camming of the flange or adaptor. The mounting of the chuck on the spindle nose shall be made either directly on the face plate or with an adaptor placed between the spindle nose and the chuck. In the latter case, the above-mentioned tests shall be carried out directly on the face plate or adaptor which has previously been mounted on the spindle nose.

9.3 Concentricity of Outside Diameter of Chuck

The chucks shall meet the requirements as laid down in Table 3.

9.4 Axial Run-Out (Camming) of Face of Chuck

The chucks shall meet the requirements as laid down in Table 3.

9.5 Accuracy of Grip on Test Bar

The chucks shall meet the requirements as laid down in Table 4.

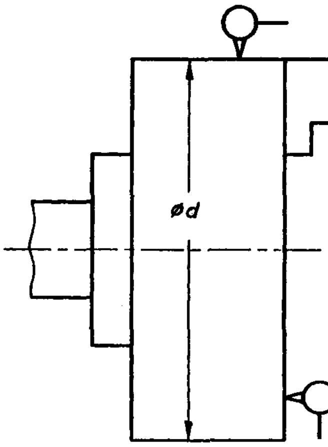
9.5.1 The number of test bars to be used is not specified. It shall be the subject of an agreement between the manufacturer and the user.

9.5.2 The sizes of test bar diameters to be used shall be proportionate to the scroll pitch so that various angular scroll positions differ from one test bar to another through an arc subtending an angle of approximately 90°

Table 3 Geometrical Tests

(*Clauses* 9.3 *and* 9.4)

All dimensions in millimetres.



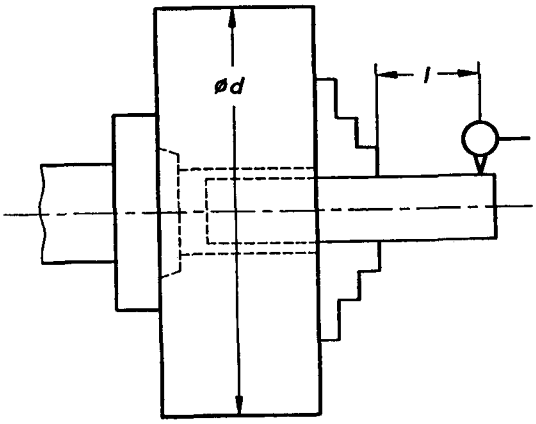
Sl No.	Nominal Size of Chuck *d*		Permissible Deviation (Total Indicator Reading)
	Over	Up to and Including	
i)	–	160	0.03
ii)	160	250	0.04
iii)	250	400	0.06
iv)	400	630	0.08

NOTE—For test in **9.4**, the dial gauge shall be placed on the largest diameter possible.

Table 4 Accuracy of Grip on Test Bar

(*Clause* 9.5)

All dimensions in millimetres.



Nominal Size of Chuck *d*		Distance of Dial Gauge from Top of Jaws *l*	Permissible Deviation Total Indicator Reading	
Over	Up to and Including		Using Master Pinion	Using Any Pinion
–	160	50	0.04	0.10
160	250	50	0.06	0.15
250	400	75	0.075	0.20
400	630	100	0.10	0.25

9.5.3 In order to ensure the maximum stability of grip of the jaws on the test bars, the test bar diameter shall never be larger than the internal chuck diameter.

9.5.4 The contact of each jaw on the test bars shall be made gripping along the centre line of each jaw, it being understood that any increase in the number of bearings or in their width would upset the centering and make the test difficult to carry out.

9.5.5 Test bars shall be made of heat-treated steel to withstand the grip of the jaws without any deformation — internal or superficial.

9.5.6 The accuracy of test bar to be used shall conform to the requirements given in **A-1** of Annex A of IS 2063.

9.6 Accuracy of Grip on Test Rings

9.6.1 External Jaws

The requirements of grip on test rings by external jaws shall meet the requirements as laid down in Table 5.

9.6.2 Internal Jaws

The requirements of grip test on rings by internal jaws shall meet the requirements as laid down in Table 6.

10 PRESERVATION AND PACKING

Chucks shall be given a suitable rust prevention treatment at the time of dispatch and shall be packed in accordance with the best trade practice.

11 MARKING

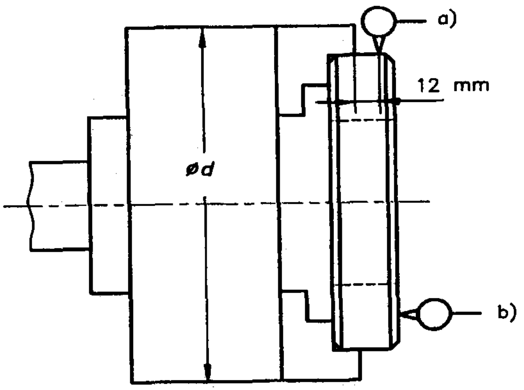
11.1 The chucks shall be marked with the nominal size, type and manufacturer's name or trade-mark.

The chucks may also be marked with the standard Mark.

11.1.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 5 Accuracy of Grip on Test Rings, External Jaws
(*Clause* 9.6.1)

All dimensions in millimetres.



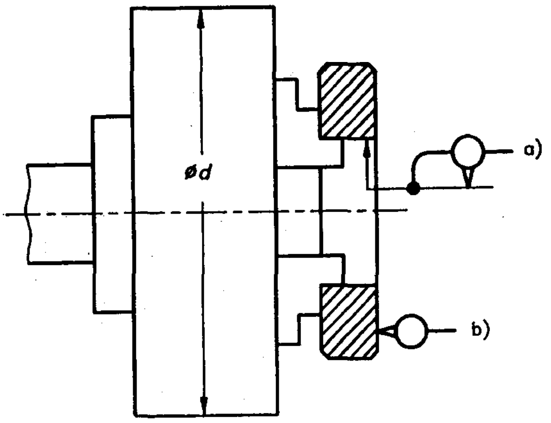
Test	Nominal Size of Chuck, ϕd		Permissible Deviation
	Over	Up to and Including	
Reading on periphery (*a*)	—	160	0.03
	160	250	0.04
	250	400	0.06
	400	630	0.075
Reading on face (*b*) as near to the periphery as practicable	—	160	0.025
	160	250	0.03
	250	400	0.04
	400	630	0.05

NOTE— Each jaw step shall be tested. A single test ring should be used for each step. The external diameter of the test ring shall be smaller than the diameter at which the steps of the jaws have been ground. Clamping of the chuck shall be carried out using the master pinion only.

Table 6 Accuracy of Grip on Test Rings, Internal Jaws

(*Clause* 9.6.2)

All dimensions in millimetres.



Test	Nominal Dia of Size, *d*		Permissible Deviation (Total Indicator Reading)
	Over	Up to and Including	
Reading on bore (*a*)	—	160	0.03
	160	250	0.04
	250	400	0.06
	400	630	0.075
Reading on face (as near to the internal diameter as practicable) (*b*)	—	160	0.025
	160	250	0.03
	250	400	0.04
	400	630	0.05

NOTE—Each jaw step shall be tested. A single test ring should be used for each step. The internal diameter of the test ring shall be larger than the diameter at which the steps of the jaws have been ground. Clamping of the chuck shall be carried out using the master pinion only.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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